DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 13-20, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 2003/0235983), Kobayashi (US 5,741,362), Juhola (5,636,762), Hurley (US 5,368,715) and Canestaro (US 4,554,184).

As to claim 13, Li discloses a system, comprising: a chamber (plating chamber 120) configured to process one or more wafers for the fabrication of microelectronic devices, wherein the chamber comprises a fluid inlet (item 102) configured to receive a process fluid from at least one of a plurality of tanks serially coupled to the chamber, and supply the process fluid to one or more wafers (see Figure 2A); the plurality of tanks (tanks 110, 100), each adapted to store a fluid used to process the wafers; and a plurality of temperature controllers (heating plates 208, control processes, etc, see paragraph 0054-57) positioned within the system such that the chamber and the plurality of tanks are characterized into at least three different zones based upon adaptations of the temperature controllers to maintain the fluid within distinct temperature ranges in the respective zones while processing the wafers. Li specifically discloses that the temperature of the fluid in the plating chamber 120 can be higher than that of the fluid in pre-heat chamber 110, which can be higher than that of the fluid in holding tank 100 (see paragraphs 0037-0039). In any event, Li is certainly capable of being used as claimed. Li discloses a storage tank, and

intermediate tank interposed between the chamber and the storage tank. Li discloses that the storage tank has the largest volume capacity (Figure 1), but appears to disclose identical volume capacities for the intermediate tank and chamber.

Li can be interpreted as disclosing that a device used to maintain fluid temperatures, and passive structures for maintaining temperature differentials, but not disclosing the use of multiple devices for controlling the temperature.

Optionally, depending on the interpretation selected for a plurality of temperature controllers, Kobayashi (US 5,741,362) discloses using three temperature adjusters at various locations of a supply chain for a electroless plating bath system (see column 1, lines 5-10). Kobayashi uses different temperature ranges in order to ensure that no deposition is produced in the supply chain (see column 2, lines 43-45). Canestaro, another electroless plating system, discloses placing temperature adjusters (heater mechansims 7 and 10) in both the supply and return lines. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the temperature adjusters of Kobayashi and Canestaro in order to ensure that deposition only takes place in the chamber.

Li clearly does not disclose a plurality of volume sensors.

Juhola discloses that it is known to use volume (or level) sensor in the tanks (items 98-101) in order to maintain proper volumes of the process fluid. Additioanlly, Hurley discloses that it is known to couple level and pH sensors to the bath or chambers (see column 3, lines 13-25). Juhola discloses that these sensor allow for refilling of the intermediate tank. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have

utilized the volume level sensors as disclosed in Juhola and Hurley in order to allow for appropriate volumes in the tanks.

Li, discloses that the holding tank (100) is larger than the pre-heat tank (item 110), but that the plating chamber and the pre-heat tank have similar volume capacity. Thus, Li discloses that one tank of the plurality of tanks has a smaller volume capacity than another tank of the plurality of tanks, but does not disclose that same one tank of the plurality of tanks comprises a larger volume capacity than the chamber. However, Canestaro discloses a system that involves supplying electroless plating solution for a supply through conduits 2 to a "master-mixing" tank 1, which is then supplied to individual plating baths C1, C2, C3 and C4 (see Figure 2, see also column 2, lines 40-59; column 4, lines 37 to column 5, line 35). Canestaro teaches that this intermediate, mixing tank should have a volume of bath that is at least 5 times to about 40 times the amount in any individual plating cell. Furthermore, changes in size and proportion is obvious. MPEP 2144.04 IV A (*In Gardner v. TEC Systems, Inc.,* 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.) One in the art would immediately recognize that an intermediate tank that is larger than the coating or plating chamber would avoid large local chemical changes and minimize or eliminate the need to respond to large changes (see column 4, lines 48-51). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the

invention to have utilized an intermediate tank in order to avoid large chemical changes and eliminate the need to respond to such changes.

As to claim 14, Li discloses that the plurality of temperature controllers are positioned such that the at least three different zones are arranged in ascending order based upon their respective temperature ranges, and wherein the zone comprising the chamber has the highest temperature range. Li specifically discloses that the temperature of the fluid in the plating chamber 120 can be higher than that of the fluid in pre-heat chamber 110, which can be higher than that of the fluid in holding tank 100 (see paragraphs 0037-0039). In any event, Li is certainly capable of being used as claimed.

As to claim 15, while Li discloses the alternative arrangement (process chamber is higher, bath chamber is lower), the applicant is claiming an apparatus, the intended use does not modify the structure of this apparatus, and Li is capable of being used as claimed.

As to claim 16, Li discloses that one of the plurality of temperature controllers (such as heating plate 208) is arranged within the chamber (the process chamber 120).

As to claim 17, Li discloses that one of the plurality of temperature controllers is coupled to a fluid inlet of the chamber (and see Figure 2a, which shows that the heating element 208 is coupled near to a fluid inlet of the chamber). The proximity of the temperature controller to the fluid inlet in Li would read upon the language "coupled".

As to claim 18, Li does not disclose that one of the plurality of temperature controllers is coupled to one of a plurality of pipes configured to transport the fluid from the plurality of tanks to the chamber. However, the placement of the temperature controllers such that they are

coupled to the pipes is obvious due to two separate rationales. First, official notice is taken that the claimed placement of the temperature controllers coupled to the pipes is considered well known and conventional. Secondly, rearrangement of parts is obvious (MPEP 2144.04 VI. C.)1

As to claim 19, Li discloses that one of the plurality of temperature controllers is arranged within one of the plurality of tanks (see Figure 2a, item 208).

As to claim 20, Li does not disclose that the at least one of the plurality of temperature controllers comprises an infrared heater. However, official notice is taken that infrared heaters are well known and conventional. The prior art discloses that any generic heating could be used (Li, paragraph 0042, "...can be pre-heated...by any suitable method"). One in the art would recognize that infrared heaters are such a suitable method (as well as electric plate heating, resistance heating, etc). One would select the heating element based on various factors, such as economics, power source capabilities, safety requirements, and any other reasonable factor. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have used infrared heating in order to meet the requirements such as economics, power source capabilities, safety requirements, and any other reasonable factor.

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1 MPEP 2144.04 VI. C. Rearrangement of Parts
In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950) (Claims to a hydraulic power press which read on the prior art except with regard to the position of the starting switch were held unpatentable because shifting the position of the starting switch would not have modified the operation of the device.); In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (the particular placement of a contact in a conductivity measuring device was held to be an obvious matter of design choice). However, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device." Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

As to claim 25, Li discloses that the tanks have different volume capacities (see paragraphs 0039, 0040, 0041 and 0042, which disclose a large volume for the holding tank, and keeping 10% of the bath in the "smaller" intermediate tank).

As to claim 26, Li discloses a plurality of pipes (see figure 1) transporting fluid as claimed, and the disposition of the tanks such that one tank is closer to the chamber (see Figure 1). Also, Li discloses the relative volume capacities, such that one tank comprises a larger volume capacity, and the intermediate tank and plating chamber having the same capacity (see paragraph 0046).

3. Claims 27-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 2003/0235983), Kobayashi (US 5,741,362) (see citations applied to claim 13 above) and further in view of Canestaro (US 4,554,184) and Shachem-Diamond (US 5,830,805)

Li as discussed above discloses a first chamber (120) as claimed, a first temperature controller, a storage tank (100), an intermediate tank (110), a first set of pipes (105) transporting process fluid from the storage tank to the intermediate tank and a second set of pipes (102) transporting the process fluid from the intermediate tank to the chamber (see citations in rejection of claim 13 above).

Li can be interpreted as disclosing that a device used to maintain fluid temperatures, and passive structures for maintaining temperature differentials, but not disclosing the use of multiple devices for controlling the temperature.

Optionally, depending on the interpretation selected for a plurality of temperature controllers, Kobayashi (US 5,741,362) discloses using there temperature adjusters at various

locations of a supply chain for a electroless plating bath system (see column 1, lines 5-10). Kobayashi uses different temperature ranges in order to ensure that no deposition is produced in the supply chain (see column 2, lines 43-45). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the temperature adjusters of Kobayashi in order to ensure that deposition only takes place in the chamber.

Li, while disclosing the first and second set of pipes, does not disclose a third set of pipes configured to transport the process fluid from the chamber directly to the intermediate tank.

However, Canestaro discloses a system with the claimed pipe systems. Canestaro discloses a first set of pipes or conduit (conduit 2) between the supply (i.e., the storage tank) and the mixing or intermediate tank, a second set of pipes (pipes 4 and 6) configured to transport the process fluid from the intermediate or mixing tank 1 to the chamber (items C1, C2, C3…), and a third set of pipes (a direct pathway is represented by pipes 9, 15, and 16, as well indirect pathways 18, 20, 21, and 23) which are configured to transport the process fluid from the chamber directly to the intermediate tank. Thus, Canestaro discloses the addition of the third pipe to a system to a system with the first and second set of pipes. Canestaro discloses that the direct pathway between the plating chamber to the intermediate mixing tank permits return of the liquid to the mixing tank (see column 6, lines 46-49). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have included a third set of pipes as in Canestaro in order to permit return of the solution or fluid to the mixing/intermediate tank.

Li, discloses that the holding tank (100) is larger than the pre-heat tank (item 110), but that the plating chamber and the pre-heat tank have similar volume capacity. Thus, Li discloses that one tank of the plurality of tanks has a smaller volume capacity than another tank of the

plurality of tanks, but does not disclose that same one tank of the plurality of tanks comprises a larger volume capacity than the chamber. Li, thus, is silent as to the volume capacity limitations.

However, Canestaro discloses a system that involves supplying electroless plating solution for a supply through conduits 2 to a "master-mixing" tank 1, which is then supplied to individual plating baths C1, C2, C3 and C4 (see Figure 2, see also column 2, lines 40-59; column 4, lines 37 to column 5, line 35). Canestaro teaches that this intermediate, mixing tank should have a volume of bath that is at least 5 times to about 40 times the amount in any individual plating cell. changes in size and proportion is obvious. MPEP 2144.04 IV A (*In Gardner v. TEC Systems, Inc.,* 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.) One in the art would immediately recognize that an intermediate tank that is larger than the coating or plating chamber would avoid large local chemical changes and minimize or eliminate the need to respond to large changes (see column 4, lines 48-51). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized an intermediate tank in order to avoid large chemical changes and eliminate the need to respond to such changes.

Additionally, Li is silent as to the presence of a set of valves coupled to the first set of pipes for circulating the process fluid between the storage tank and the intermediate tank, depending on an operating mode of the valves. However, valves are conventional for the control of fluid circulation. In Shacham-Diamand, valves 123, 106, 126, 127 and 156 all control the

circulation of fluid in and out of the processing chamber, depending on the operating mode of the valves. One in the art would appreciate that valves would allow for adjustment of the fluid in the chamber. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such valves in order to adjust the properties and quantity of fluid in the chamber.

As to claims 28-31, the apparatus of Li is capable of being used with any of the claimed temperature ranges or relationships. Li specifically discloses that the temperature of the fluid in the plating chamber 120 can be higher than that of the fluid in pre-heat chamber 110, which can be higher than that of the fluid in holding tank 100 (see paragraphs 0037-0039). In any event, Li is certainly capable of being used as claimed.

4. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 2003/0235983), Kobayashi (US 5,741,362) and Canestaro (US 4,554,184) and Schacham-Diamand (5,830,805) as applied above, and further in view of Juhola (5,636,762)

As to claim 32, Li clearly does not disclose a plurality of volume sensors.

Juhola discloses that it is known to use volume (or level) sensor in the tanks (items 98-101) in order to maintain proper volumes of the process fluid. Juhola discloses that these sensor allow for refilling of the intermediate tank. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the volume level sensors as disclosed in Juhola in order to allow for appropriate volumes in the tanks.

Response to Arguments

5. Applicant's arguments (based on the amendments) with respect to claims 1-4, 8-20, 25-32 have been considered but are unpersuasive.

6. With respect to the amendments, new references have been applied. For example, shacham-diamand (previous made of record) discloses valves in connection with holding tanks and coating chambers.

7. Changes in size and proportion is obvious. MPEP 2144.04 IV A (*In Gardner v. TEC Systems, Inc.,* 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.) Thus, applicants slight differences in the size and proportion of the chambers from Li is obvious.

8. In response to applicant's extensive arguments (see page 9, addressing the rejection of claim 13 - arguing that "Li lacks the necessary motivation") that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Furthermore, the Supreme Court has rejected the rigid teaching, suggestion or motivation test. See *KSR International Co. v. Teleflex Inc., et al.*, 550 U.S. _____, docket # 04-1350, page 11. The Supreme Court cautions that when familiar elements are combined to yield predictable, the combination is likely to be obvious.

Here, applicant took a known 3 chamber solution supply processing system (Li), combined with a known temperature control system (Kobayashi), and a known volume control system (Juhola). The result is rather predictable - a solution supply system that has temperature and volume controls. No unexpected results have occurred.

9. With respect to the argument that "None of the cited art, either alone or in combination, provides teaching, suggestion or motivation for a system comprising a chamber and a plurality of tanks, wherein one tank of the plurality of tanks comprises a larger volume capacity than the chamber and a smaller volume capacity than another tank of the plurality of tanks" as made on page 7 of the remarks filed 9/10/2007, this is unpersuasive because Li teaches using an intermediate tank that is smaller in volume than the supply or larger tank, and Canestaro teaches using an intermediate tank that is larger in volume than the chamber.

10. In response to applicant's argument that "None of the cited art, either along or in combination, provides teaching, suggestion or motivation for a system having: (i) an intermediate tank interposed between a chamber and a storage tank, and (ii) a third set of pipes configured to transport a process fluid from the chamber directly to the intermediate tank" as made on page 8 of the remarks filed 9/10/2007, this is unpersuasive because Canestaro (US teaches such a system. Canestaro teaches an intermediate or mixing tank, and a third set of pipes for transporting process fluid from the chamber to the intermediate tank.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George R. Koch III whose telephone number is (571) 272-1230 (TDD only). If the applicant cannot make a direct TDD-to-TDD call, the applicant can communicate by calling the Federal Relay Service at 1-866-377-8642 and giving the operator the above TDD number. The examiner can also be reached by E-mail at george.koch@uspto.gov <mailto:george.koch@uspto.gov> in accordance with MPEP 502.03. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/George R. Koch III/
Primary Examiner, Art Unit 1791

6/8/2008